

# PATENT SPECIFICATION

764,392

Inventor:—JAMES EDWARD KINNEAR.

Date of filing Complete Specification: Dec. 30, 1952.

Application Date: Jan. 14, 1952. No. 25402/54.

(Divided out of No. 764,391)

Complete Specification Published: Dec. 28, 1956.



Index at Acceptance:—Class 20(2), F3A.

## COMPLETE SPECIFICATION.

### ERRATUM

#### SPECIFICATION NO. 764,392

Page 3, line 64, after "L-shaped" insert "cross-section. Each of the two webs has a row of aligned".

THE PATENT OFFICE,  
5th May, 1958

DB 04851/1(2)/3606 150 4/58 R

15 subject of the concurrent British Patent Application No. 1035 of 1952 (Serial No. 764,391), from which the present application has been divided.

20 The framework structure according to such concurrent application is built up, at least in part, from strips each having aligned elongated slots, and includes at least one joint at which two such strips meet at right angles, such joint including a generally triangular anchor plate having three bolt holes spaced at the corners of a right-angled triangle, the length of each of the shorter sides of which is not less than that required to accommodate two bolts respectively passing through the adjacent ends of two consecutive slots in the strips and is not greater than that required to accommodate two bolts passing respectively through the remote ends of such two consecutive slots, the anchor plate being sandwiched between the strips and being bolted to them by three bolts passing through its holes and through the slots in the strips.

30 The angle strip according to the present invention comprises two similar webs at right angles, each having a single row of aligned equally spaced elongated slots, wherein the space between the inside surface of one web and the near edge of a slot in the other web exceeds the space between the other edge of the slot and the free edge of the web

length and are preferably provided with cutting marks adjacent to the mid-points of the spaces between the slots, with or without further cutting marks adjacent to the mid-points of the lengths of the slots.

60 A preferred arrangement of angle strip according to the invention is illustrated in the accompanying drawings, in which:—

65 Figures 1 and 2 show the angle strip respectively in elevation and in end view;

Figure 3 illustrates a modified form of angle strip; and

70 Figures 4—7 respectively illustrate four alternative ways of bolting angle strips together to form useful girder-like members.

75 In the arrangement shown in Figures 1 and 2, the angle strip A consists of a strip of steel, of any desired length and having a width which may for example be of the order of three inches, bent through a right angle along its centre line so as to form an angle strip of L-shaped cross-section. Each of the two webs A<sup>1</sup>, A<sup>2</sup> has a row of aligned elongated slots A<sup>3</sup> extending along its whole length, the slots all being of the same length and being equally spaced from one another. The slot width is chosen to suit the bolts used, say of a quarter of an inch diameter, with just sufficient clearance for ready and easy insertion of the bolts.

85 Whilst (as shown in Figure 3) the slots A<sup>3</sup>

Best Available Copy

Inventor:—JAMES EDWARD KINNEAR.



Date of filing Complete Specification : Dec. 30, 1952.

Application Date : Jan. 14, 1952. No. 25402/54.

(Divided out of No. 764,391)

Complete Specification Published : Dec. 28, 1956.

Index at Acceptance :—Class 20(2), F3A.

## COMPLETE SPECIFICATION.

## Improvements in or relating to Angle Strips for Framework Structures.

We, WAGON REPAIRS LIMITED, a British Company, of Imperial Chambers, John Bright Street, Birmingham 1, do hereby declare the invention, for which we pray that  
 5 a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an angle strip for use in building up a framework structure, and is more especially intended for use in a framework structure of the kind forming the subject of the concurrent British Patent Application No. 1035 of 1952 (Serial No.  
 10 764,391), from which the present application has been divided.

The framework structure according to such concurrent application is built up, at least in part, from strips each having aligned elongated slots, and includes at least one joint at which two such strips meet at right angles, such joint including a generally triangular anchor plate having three bolt holes spaced at the corners of a right-angled triangle, the  
 20 length of each of the shorter sides of which is not less than that required to accommodate two bolts respectively passing through the adjacent ends of two consecutive slots in the strips and is not greater than  
 30 that required to accommodate two bolts passing respectively through the remote ends of such two consecutive slots, the anchor plate being sandwiched between the strips and being bolted to them by three bolts  
 35 passing through its holes and through the slots in the strips.

The angle strip according to the present invention comprises two similar webs at right angles, each having a single row of aligned  
 40 equally spaced elongated slots, wherein the space between the inside surface of one web and the near edge of a slot in the other web exceeds the space between the other edge of the slot and the free edge of the web

and also exceeds half the space between 45 adjacent ends of two consecutive slots. The length of each slot preferably exceeds the length of the space between two consecutive slots in a row.

The slots in the two rows may be positioned in register with one another, or alternatively the slots in the two rows may be positioned in staggered relationship with one another, so that the mid-point of a slot in one web is in register with the mid-point of a space between slots in the other web. 50

The angle strips may be of any desired length and are preferably provided with cutting marks adjacent to the mid-points of the spaces between the slots, with or without further cutting marks adjacent to the mid-points of the lengths of the slots. 55

A preferred arrangement of angle strip according to the invention is illustrated in the accompanying drawings, in which:— 60

Figures 1 and 2 show the angle strip respectively in elevation and in end view; 65

Figure 3 illustrates a modified form of angle strip; and

Figures 4—7 respectively illustrate four alternative ways of bolting angle strips together to form useful girder-like members. 70

In the arrangement shown in Figures 1 and 2, the angle strip A consists of a strip of steel, of any desired length and having a width which may for example be of the order of three inches, bent through a right angle along its centre line so as to form an angle strip of L-shaped cross-section. Each of the two webs A<sup>1</sup>, A<sup>2</sup> has a row of aligned elongated slots A<sup>3</sup> extending along its whole length, the slots all being of the same length and being equally spaced from one another. The slot width is chosen to suit the bolts used, say of a quarter of an inch diameter, with just sufficient clearance for ready and easy insertion of the bolts. 80 85

Whilst (as shown in Figure 3) the slots A<sup>2</sup>

in the two webs  $A^2$  of the angle strip A may be arranged in staggered relationship (that is such that if the angle strip were transversely cut through the mid-point of the length of one slot  $A^3$  in one web  $A^1$ , the cut would pass through the mid-point of a space between two consecutive slots  $A^3$  in the other web  $A^2$ ), it will usually be preferably, as in Figure 1, to arrange the two rows of slots  $A^3$  in register with one another, that is such that a transverse cut through the mid-point of a slot  $A^3$  in one web  $A^1$  would also pass through the mid-point of a slot  $A^3$  in the other web  $A^2$ .

The row of slots  $A^3$  in each web is located slightly nearer to the free edge of the web than to the inside surface of the outer web. This permits two angle strips A to be bolted together to form a composite strip of right-angled Z-section (as shown in Figure 4) or a composite strip of channel-section (as shown in Figure 5), the width of the web being such that, when strips are bolted together in this way, the free edge of one of the engaging webs will lie clear of the slight rounding of the angle of the other angle strip. It will be clear that, if desired, two such channel-section composite strips can be bolted together to form a composite strip of rectangular box-section (as shown in Figure 6). Another useful constructional form consists of two angle strips bolted together to form a composite strip of T-section (as shown in Figure 7).

It is intended that the angle strips A should be cut to the desired length for use, and for this purpose cutting marks  $A^4$  are provided on the webs adjacent to the mid-points of the spaces between the slots  $A^3$ , to indicate where the strips should preferably be cut. If these cutting marks  $A^4$  are strictly adhered to, the available lengths of strip after cutting will differ from one another in regular steps equal to the pitch of the slots, and this has been found to provide an adequate range of possible variation for the large majority of practical uses. The preferred pitch for the slots is of the order of two inches.

It is, however, important that the length of the space between consecutive slots should be less than twice the distance between the inner side edge of one slot and the inside surface of the other web of the strip. With this arrangement it is possible when one strip, cut off at one of the cutting marks, is

placed with its length at right angles to that of another strip, a bolt can then be inserted through the slots to secure a web of one strip to a web of the other strip, whilst leaving the end of one strip clear of the rounded angle of the other strip, the non-engaging webs of the two strips projecting on the same side of the pair of engaging webs.

The angle strip according to the invention, is especially intended for use in the framework structure forming the subject of the above-mentioned concurrent Patent Application No. 1035 of 1952, and the use of the angle strips in combination with a special anchor plate for forming a strong right-angled joint between two angle strips is specifically claimed in such concurrent Application.

What I claim is:—

1. An angle strip for use in building up a framework structure, comprising two similar webs at right angles, each having a single row of aligned equally-spaced elongated slots, wherein the space between the inside surface of one web and the near edge of a slot in the other web exceeds the space between the other edge of the slot and the free edge of the web and also exceeds half the space between adjacent ends of two consecutive slots.

2. An angle strip as claimed in Claim 1, in which the length of each slot exceeds the length of the space between two consecutive slots in a row.

3. An angle strip as claimed in Claim 1 or Claim 2, in which the slots in the two webs are positioned in register with one another.

4. An angle strip as claimed in Claim 1 or Claim 2, in which the slots in the two webs are positioned in staggered relationship with one another, so that the mid-point of a slot in one web is in register with the mid-point of a space between slots in the other web.

5. An angle strip as claimed in any one of Claims 1—4, having cutting marks adjacent to the mid-points of the spaces between the slots, with or without further cutting marks adjacent to the mid-points of the lengths of the slots.

6. An angle strip substantially as described with reference to the accompanying drawings.

A. F. PULLINGER,  
Agent.

#### PROVISIONAL SPECIFICATION.

#### Improvements in or relating to Angle Strips for Framework Structures.

We, WAGON REPAIRS LIMITED, a British Company, of Imperial Chambers, John Bright Street, Birmingham 1, do hereby de-

clare this invention to be described in the following statement:—

This invention relates to an angle strip

for use in building up a framework structure, and is more especially intended for use in a framework structure of the kind forming the subject of the concurrent British Patent Application No. 1035 of 1952 (Serial No. 764,391), from which the present Application is divided.

The framework structure according to the invention of such concurrent Application includes two strips each having a row of aligned equally spaced elongated slots, the two strips being arranged with their lengths at right angles to one another, and a generally triangular anchor plate having three bolt holes spaced at the corners of a right-angled triangle, the length of each of the shorter sides of which is not less than that required to accommodate two bolts respectively passing through the adjacent ends of two consecutive slots in the strips and is not greater than that required to accommodate two bolts passing through the remote ends of such two consecutive slots, the anchor plate being sandwiched between the strips and being bolted to them by three bolts passing through its three holes and through the slots in the strips. Each of the two slotted strips preferably consists of an angle strip having an L-shaped cross-section, with two rows of similar strips, one in each of the two webs.

The angle strip according to the present invention comprises two similar webs at right angles, each having a row of aligned equally-spaced elongated slots, wherein the space between the inside surface of one web and the near edge of a slot in the other web exceeds the space between the other edge of the slot and the free edge of the web and also exceeds half the space between adjacent ends of two consecutive slots. Such an angle strip can be cut to length, as required, and in practice it is found that a range of specified lengths differing from one another in small steps will be adequate to meet the large majority of requirements. For this purpose, the angle strip is preferably provided with cutting marks adjacent to the mid-points of the spaces between the slots, with or without further cutting marks adjacent to the mid-points of the lengths of the slots. It is intended that normally the strips should only be cut to length at such cutting marks.

The invention may be carried into practice in various ways, but the following may be instanced as a preferred practical arrangement according thereto.

In this arrangement, the angle strip consists of a strip of steel, of any desired length and having a width which may for example be of the order of three inches, bent through a right angle along its centre line so as to form an angle strip of L-shaped elongated slots extending along its whole length, the

slots all being of the same length and being equally spaced from one another. The slot width is chosen to suit the bolts used, say of a quarter of an inch diameter, with just sufficient clearance for ready and easy insertion of the bolts.

Whilst the slots in the two webs of the angle strip may be arranged in staggered relationship (that is such that if the angle strip were transversely cut through the mid-point of the length of one slot in one web, the cut would pass through the mid-point of a space between two consecutive slots in the other web), it will usually be preferable to arrange the two rows of slots in register with one another, that is such that a transverse cut through the mid-point of a slot in one web would also pass through the mid-point of a slot in the other web.

The row of slots in each web is located slightly nearer to the free edge of the web than to the inside surface of the other web. This permits two angle strips to be bolted together to form a composite strip of right-angled Z-section or a composite strip of channel-section, the width of the web being such that, when strips are bolted together in this way, the free edge of one of the engaging webs will lie clear of the slight rounding of the angle of the other angle strip. It will be clear that, if desired, two such channel-section composite strips can be bolted together to form a composite strip of rectangular box-section. Another useful constructional form consists of two angle strips bolted together to form a composite strip of T-section.

It is intended that the angle strips should be cut to the desired length for use, and for this purpose cutting marks are provided on the webs adjacent to the mid-points of the spaces between the slots, to indicate where the strips should preferably be cut. If these cutting marks are strictly adhered to, the available lengths of strips after cutting will differ from one another in regular steps equal to the pitch of the slots, and this has been found to provide an adequate range of possible variation for the large majority of practical uses. The preferred pitch for the slots is of the order of two inches.

It is however important that the length of the space between consecutive slots should be less than twice the distance between the inner side edge of one slot and the inside surface of the other web of the strip. With this arrangement it is possible when one strip, cut off at one of the cutting marks, is placed with its length at right angles to that of another strip, a bolt can then be inserted through the slots to secure a web of one strip to a web of the other strip, whilst leaving the end of one strip clear of the rounded angle of the other strip, the non-engaging

webs of the strips projecting on the same side of the pair of engaging webs. In order to provide a strong right-angled joint of this kind between two angle strips, an anchor

plate is used in the manner described in the concurrent Application above mentioned.

A. F. PULLINGER,  
Agent.

Abingdon : Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1956.  
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,  
from which copies may be obtained.

A1 FIG. 1.

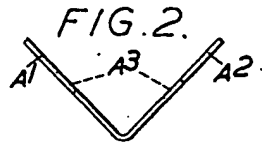
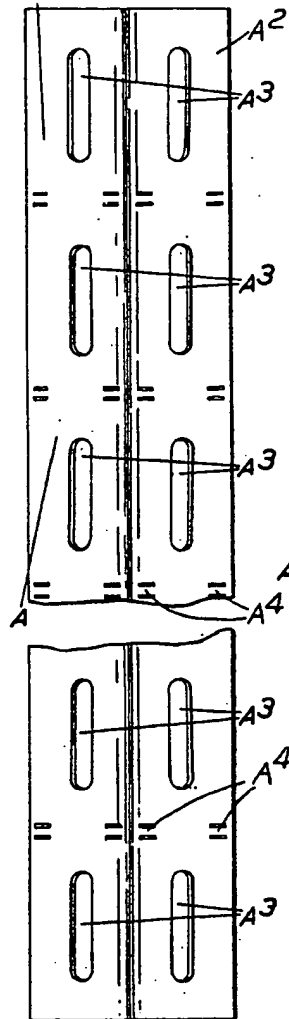


FIG. 3.

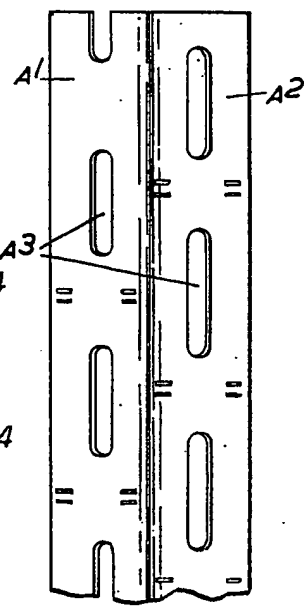


FIG. 4.

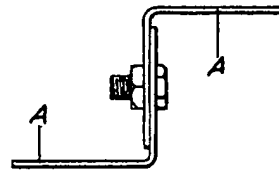


FIG. 5.

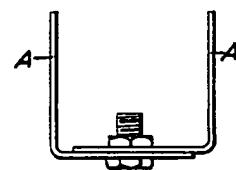


FIG. 6.

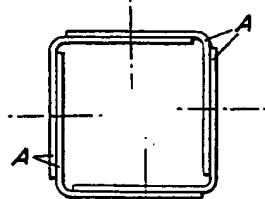
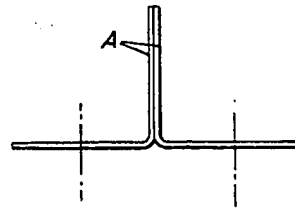


FIG. 7.



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**